Redefining MRI:
From Image to Insight

ICMRI 2026
THE 14th INTERNATIONAL CONGRESS ON MRI
& 31st ANNUAL SCIENTIFIC MEETING OF KSMRM

AUGUST 27 - 28, 2026
Grand Walkerhill Seoul, Seoul, Korea
https://icmri.ksmrm.org/2026m

MSK 1

MS01-2

AI-Driven Quantitative Imaging in MSK MRI

Kyu-Chong Lee

Korea University Anam Hospital, Korea

Background:
Musculoskeletal (MSK) MRI has traditionally relied on qualitative visual assessment and subjective interpretation. Recent advances in Artificial Intelligence (AI) have accelerated the transition toward automated quantitative imaging, enabling objective tissue characterization and high-throughput extraction of imaging biomarkers. This presentation aims to review the emerging role of AI-driven quantitative MSK MRI and discuss its potential to support clinical decision-making.

Main Text:
The lecture will review four major domains through which AI is advancing quantitative imaging in MSK MRI. First, AI enables extraction of quantitative biomarkers from routine MRI examinations, including automated segmentation, volumetric measurements, muscle quality assessment, MRI-based scoring systems such as the vertebral bone quality (VBQ) score, and radiomics-based feature extraction. Second, AI facilitates large-scale implementation of quantitative MRI techniques by automating tissue analysis from diffusion imaging, fat fraction imaging, T2/T1ρ mapping, and other compositional MRI methods. Third, AI integrates imaging biomarkers into predictive models for disease diagnosis, prognosis, treatment response assessment, and personalized clinical decision-making. Representative applications in musculoskeletal tumors, osteoarthritis, muscle disorders, and sports injuries will be presented. Finally, emerging quantitative MR technologies such as synthetic MRI and MR fingerprinting will be discussed as future directions. Current challenges, including standardization, reproducibility, external validation, explainability, and integration into routine clinical workflow, will also be addressed.

Conclusion:
AI-driven quantitative MSK MRI has the potential to transform radiological practice by providing objective imaging biomarkers and advancing precision medicine. Overcoming current technical and clinical barriers will be essential for translating these technologies from research settings into routine daily workflow.

Keywords: *Quantitative imaging, Musculoskeletal, MRI, Artificial intelligence*